

Some Algebra of Calculus

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$$\frac{5x^4}{8} = \frac{5}{8}x^4$$

$$\frac{x^2 + 3x}{-6} = -\frac{1}{6}(x^2 + 3x)$$

$$x(x+1)^{-1/2} + (x+1)^{1/2}$$

$$= (x+1)^{-1/2} [??]$$

$$= (x+1)^{-1/2} [x + (x+1)^1]$$

$$= (x+1)^{-1/2} (2x+1)$$

FACToring OUT SMALLEST COMMON BASE

$$\frac{x+2}{(x^2+4x-3)^2} = (??) (2x+4)(x^2+4x-3)^{-2}$$

$$\frac{x+1}{(x^2+2x-3)^2} = (??) (2x+2)(x^2+2x-3)^{-2}$$

INSERTING FACTORS FOR FUN AND PROFIT

$$\frac{4x^2}{9} - 4y^2 = \frac{x^2}{???} - \frac{y^2}{???}$$

$$= \frac{x^2}{\frac{9}{4}} - \frac{y^2}{\frac{1}{4}}$$

$$\frac{3x^2}{4} - \frac{9y^2}{16} = \frac{x^2}{???} - \frac{y^2}{???}$$

$$= \frac{x^2}{\frac{4}{3}} - \frac{y^2}{\frac{16}{9}}$$

TOPSY TURVY FRACTIONS

$$\frac{-4x}{(1 - 2x^2)^2} = -4x(1 - 2x^2)^{-2}$$

$$\frac{2}{5x^3} - \frac{1}{\sqrt{x}} + \frac{3}{5(4x)^2}$$

$$= \frac{2}{5}x^{-3} - x^{-1/2} + \frac{3}{5}(4x)^{-2}$$

POSITIVE THINKING IN REVERSE

$$\frac{x + 2x^2 + 1}{\sqrt{x}} = x^{1/2} + 2x^{3/2} + x^{-1/2}$$

$$\frac{x^2 - 2}{x + 1} = x - 1 - (x + 1)^{-1} \quad \text{(LONG OR SYNTHETIC DIVISION)}$$

$$\frac{x + 7}{x^2 - x - 6} = \frac{???}{x - 3} - \frac{???}{x + 2} = \frac{2}{x - 3} - \frac{1}{x + 2}$$

RECALL PARTIAL
FRACTION
DECOMPOSITION?

$$x + 7 = A(x + 2) + B(x - 3)$$

$$\text{If } x = 3, 10 = 5A \implies A = 2$$

$$\text{If } x = -2, 5 = -5B \implies B = -1$$

SPLITTING FRACTIONS